

Doctoral Dissertation Abstract

**Comparing Science Education in Lower Secondary Schools in Myanmar and Japan:  
Science Curricula and Science Teacher Education**

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## ABSTRACT

Myanmar has been initiating many plans for the improvement of its education system including basic education curriculum reform and upgrading teacher education. In the past, a definite curriculum framework has never been worked out in Myanmar although there were uses of different components such as curriculum, textbooks and teachers' guides. Besides the need to upgrade basic education including curriculum and textbooks, there are some areas that need to be addressed in teaching and learning process such as preparing qualified teachers. Therefore, it is necessary to review and analyze the current curriculum and textbooks used in schools as well as teacher training system.

Part of reform in Myanmar is improving the quality of teacher education. It includes both pre- and in-service education, and it demands the analysis of pre-service teacher education provided in Myanmar and the continuous support and training for in-service teacher education. To achieve that, instead of analyzing only Myanmar's system, this research compares Myanmar's education system with that of Japan, a high performing country, in a comparative way because comparative case study provides the researcher with the opportunity to learn examples occurring in other contexts. The results from uncovering educational systems, practices and identification of procedures in other contexts could be used to adopt for the better provision in our own home context. At the same time, unique and best practices, implementing systems, and procedures can be learned for the improvement of our own contexts. Therefore, this study's overall aim is to analyze and compare the curricula and textbooks, and teacher education especially focusing on science education in Myanmar and Japan.

The dissertation is divided into four chapters as follows:

Chapter 1 is about introducing the background of the study including the justification of conducting comparative study, the basic education system and teacher education system in Myanmar and Japan, reasons for selecting Japan to compare with Myanmar, aims of the study,

research questions, literature review, research methods, theoretical framework, and conceptual framework. Based on the motivation to analyze one's system (i.e., Myanmar's), for more effective analysis, it is compared with more achieving and advanced country in education system, Japan, in this study. With that purpose, this study analyzes and compares the science curricula of Myanmar and Japan in terms of curriculum objectives in Myanmar, and the Course of Study in Japan, science textbooks' content as well as the provision of pre-service and in-service secondary science teacher education. To achieve the purpose of the study, the following two comparative studies are conducted which are elaborated in chapters 2 and 3.

Chapter 2 is about the analysis of science curricula and textbooks at the lower secondary level because textbook analysis can lead to a comparison of the curricula in two nations. In addition, it explored how curriculum objectives are articulated in the textbook content in a developing country—Myanmar and a developed country—Japan. The first part of chapter 2 is exploring the curriculum objectives mandated in Myanmar and Japan. Content analysis was employed to analyze and compare science curriculum objectives in Myanmar and Japan. The results revealed that both countries' curriculum objectives are clearly mandated to cultivate students' scientific knowledge, skills, and attitudes which are required in this era. However, the objectives have different emphasis, namely, the importance of scientific exploration and development in Myanmar and that of natural aspects (focusing on natural things and phenomena) or nature herself in Japan. Japan's curriculum seeks to encourage active learning, exploration, collaboration, critical thinking, and the evaluation and interpretation of natural phenomena through scientific inquiry-based approach.

The second part of chapter 2 is investigating how the curriculum objectives were articulated in science textbooks in Myanmar and Japan. Deductive content analysis with qualitative approach was employed to analyze and compare the articulation of science textbooks' content on curricula's objectives. To achieve that, Grade-6 in Myanmar and Grade-

7 in Japan, the beginning grade at lower secondary level in each country, were selected as the focus of the study. Based on the comparison, two major distinct findings were presented as the exchanges of knowledge between the two contexts to learn from each other. The first one is Myanmar's science textbook's description of some technical scientific terms (e.g., reflection of light and convex mirrors) in both mother tongue (i.e., Burmese) and English. The second one is the Japanese science textbook's employment of a step-by-step and detailed scientific inquiry-based approach for the students to learn science concepts. This research revealed the focuses and intentions of science curriculum objectives and textbook contents that articulate those objectives. This in turn helps the policy makers to make informed decision for the improvement of science curriculum objectives and textbooks. Intended curriculum such as science curricula and textbooks used in the classroom plays an important role in the teaching-learning process. In a similar vein, teachers as one of the major stakeholders who implement that intended curriculum take crucial role. Consequently, how they are trained and supported before and after entering teaching profession is paramount. Therefore, chapter 3 explores and compares pre- and in-service teacher education in Myanmar and Japan.

Chapter 3 is about the comparative analysis of pre-service and in-service secondary science teacher education in Myanmar and Japan. Similar to the importance of analyzing the curricula and textbooks mainly used to educate the students, the analysis of pre-service teacher education in terms of mandated national policies and teacher education programs implemented at the university level is crucial. This is because pre-service teacher education is the very first step for preparing teachers, and quality teacher training is essential to produce qualified teachers. It is also important to design the teacher education curriculum that best prepares teachers with required knowledge and skills. Therefore, the first part of chapter 3 analyzes and compares three major types of knowledge by Shulman (1987) such as Content Knowledge (CK), Pedagogical Knowledge (PK) and Pedagogical Content Knowledge (PCK) present in

pre-service teacher education policies and programs in Myanmar and Japan. Similar to science curriculum and textbook, this study focused on teacher education for secondary science teachers. According to the result, types of knowledge found in national education policies and programs in Myanmar were CK, PK and PCK. In Myanmar's program, the subjects, however, were fixed and limited, and pre-service teachers do not have a variety of subjects (CK) to choose according to their requirements and interests. On the other hand, in Japan, besides CK, PK and PCK, Technological Knowledge (TK) was also found. This result suggests the provision of a balanced and sufficient knowledge of PCK, with the policy and implementation for the provision of necessary skills to employ in their teaching, for example. This can help equip pre-service teachers well with required knowledge and skills before they enter the teaching profession. Therefore, mandated national policies and courses provided by the teacher training institutions/universities should consider this point. After analyzing the provision of pre-service teacher education, this study also explored in-service teacher education provided in two countries, and it is discussed in the second part of chapter 3.

Second part of chapter 3 is about the analysis of in-service teacher education for continuous support for in-service teachers. For the improvement of quality of education, equity in accessing qualified teachers is important, and provision of quality pre-service teacher education can be completed by the provision of in-service teacher education. Therefore, in-service teacher education for science teachers in Myanmar and Japan was analyzed and compared. To be specific, in-service teacher education provided nationwide for the introduction of new curriculum 2016-2021 in Myanmar was discussed. On the other hand, in-service teacher education provided at Hiroshima city and Hiroshima prefectural education centers in Japan was discussed. A case study research design was employed along with two major data collection methods: document analysis and semi-structured interviews (only in Japan part to support interpretation of documents). The results revealed the well-organized in-

service teacher education in Japan, which is well-organized, continuous and very supportive for professional development of teachers. On the other hand, in-service teacher education in Myanmar was mainly one-shot through a 4-layer cascade approach which resulted in the less effectiveness at the lowest level of training process. Therefore, the provision of more effective, direct, continuous, systematic and mandatory in-service teacher education in Myanmar is suggested for the continuous professional development of science teachers in Myanmar. The implication of this study is for teacher education in developing countries such as Myanmar to effectively determine and design in-service teacher education considering the local and national level requirements.

Chapter 4 is about the conclusion of the study. It discusses the areas of improvement in education from view of comparative studies in the fields of science curriculum, science textbooks as well as pre-and in-service science teacher education. This research revealed the focuses and intentions of science curriculum objectives and textbook contents to help the policy makers make informed decision for the improvement of science curriculum objectives and textbooks. The results from comparative analysis of pre-service and in-service teacher education in Myanmar and Japan suggested the provision of a balanced and sufficient knowledge of PCK for equipping knowledge and skills to employ in education before they enter the teaching profession. It is suggested that Myanmar future in-service teacher education could consider the provision of more effective, continuous, systematic and mandatory in-service teacher education for the continuous professional development of science teachers in Myanmar. As for the limitations of the study, this research presented what was found in the current science curricula and textbooks in Myanmar and Japan. It is suggested that scholars and researchers could explore how teachers practice their skills in real classrooms. This research explores pre- and in- service teacher education for science to study the general trends and provision of PCK in two countries by utilizing only the mandated policies and university

programs employing document analysis. Future studies are suggested to investigate the attitude of the pre-service teacher toward teacher learning and the effectiveness of in-service training programs through interview with in-service teachers.